

REMARKS

1. The rejection of claims 1 – 5, 7, 9 under 35 USC 112 par. 2:

The claims have been amended with a view to overcoming the rejection of these claims.

Concerning the pore size (claim 7), it is noted that it is smaller than the size of the modifier molecules (See page 6, last line to page 7, line 2). The language of claim 7 has been appropriately corrected.

2. Claim 4 has been amended. The smaller range is now defined in new claim 13.

3. Claim 11 has been written in independent form and claims 14 – 20, which depend directly or indirectly on claims 11, have been added to appropriately cover the subject matter originally intended to be covered by the reference in original claims 11 to claims 2 – 9,

Reconsideration of the rejection of claims 1 – 5, 7, 9, under 35 USC § 112 and the objections to claim 11 is respectfully requested.

4. The claim rejections under 35 USC § 102.

5. With regard to the rejection of claims 1, 2, 3, 4, 5, 6, 8, 9 under 35 USC 102(b) as being anticipated by Friesen et al. (US 5 753 008), it is pointed out that Friesen et al. does not disclose a cleaning step following the contacting of the polyimide body by a modifier substance. As described by Friesen et al. in column 7, example 1, a hollow fiber membrane is formed, cleaned in isopropyl alcohol and dried in air for several hours. Subsequently, the hollow fiber is imidized and cross-linked. Also, in example 2, the hollow fibers, after having been contacted for a minute by a coating solution, are only dried by hot nitrogen gas, but are not cleaned.

Consequently, Friesen et al. does not disclose the cleaning of the membrane after it has been contacted by a modifier substance.

6. Also, Linder et al. (US 5 049 282) does not anticipate claim 1 of the present application: This document discloses semi-permeable composite membranes consisting of a

porous substrate and at least two layers of a film-forming polymer, wherein the first layer consists of a monomer or a polymer diazonium salt which is cross-linked with the substrate by the addition of alkali. The product of this intermediate step is coated by a hydrophilic polymer which is cross-linked with the substrate by an ionic connection, wherein either the hydrophilic polymer or the functional connection has ionic groups for the cross-linking of the hydrophilic polymer with the substrate.

However, the pre-finished polyimide body is not contacted by an aqueous modifier solution, but is only coated with diazonium salts which are produced from amine-containing compounds and which are cross-linked with the substrate by the addition of alkali. Consequently, there is no disclosure in Linder et al. of any aqueous modifier solution. Claim 1 is therefore not anticipated by Linder et al. as alleged by the Examiner.

7. The claim rejection under 35 USC 103.

8. and 9. The Examiner alleges that claim 1 is obvious in view of Tseng et al. (US 5 433 852) and Reale Jr. (US 5 085 778):

Tseng (US 5 433 852) discloses a modified polyvinyl chloride separation membrane with an increased permeability for water and an increased contamination resistance as well as hydrophilic properties. For the modification of the PVC membrane, it is contacted by a solution which comprises a compound having an amino functional group, preferably in the presence of an alkali alcoholite catalyst wherein the PVC membrane is subsequently heat treated at an elevated temperature. The membrane may also be heat treated in a treating bath at high temperature or dipped in the solution at room temperature and heat-treated after the removal from the treating bath.

However, in contrast to the Examiner's allegation, it would not have been obvious for a person skilled in the art at the time, the invention was made, to treat the surface of a conventional porous membrane of polyimide with the method proposed in Tseng et al. because Tseng et al. is concerned with basically different materials and reactions so that a simple transfer of the method used by Tseng et al. to the structure and procedure according to the present invention is not possible. Tseng et al. is concerned with halogenized membrane polymers. The halogen must be split off while forming a double bond which is then caused to

react. The treatment disclosed in Tseng et al. cannot be applied to a polyimide membrane. It would not be functional. The use of the Tseng et al. method in connection with polyimide membranes is therefore certainly not obvious.

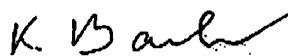
Reale jr. (US 5 085 778) discloses membranes for the separation of water from aqueous solutions using isopropyl alcohol. The membranes comprise a thin, non-porous separating layer consisting of a polyimine which was cross-linked by heating. The membrane has a composition structure with a highly porous support layer. The support layer consists of a polysulfone polymer or poly acrylnitrile. Reale Jr. is concerned with the cross-linking of the polyimine layer on a support membrane which is then used in a pervaporation process. This document is not concerned with, and, of course, does not disclose, a polyimide membrane nor an amine modifier. It is rather concerned with the interlinking of polyimine as composite layer on a suitable membrane. The high temperature used in the process described clearly indicates that it is not a thermal cross-linking what is to be initiated. Quite obviously, also Reale et al. does not render the present invention obvious but rather leads a person skilled in the art away from the present invention.

The arguments presented above with regard to claim 1 also apply to claim 11.

Reconsideration of these claims is respectfully requested. Claims 1 to 12 and 13 as well as claims 14 to 20 are dependent on claims 1 and 11, respectively, so that they include all the features of claims 1 and, respectively, claim 11. They relate to features considered advantageous in connection with the subject matter defined in the respective base claims and should be patentable in connection with the base claims 1 and 11, respectively.

Reconsideration of claims 2 to 10 and 12 to 20 is also requested and allowance of claims 1 to 20 is solicited.

Respectfully submitted,



Klaus J. Bach, Reg. No. 26832